

REMARKS

In the Office Action the Examiner noted that claims 1-8 and 10-19 were pending in the application. The Examiner allowed claims 18 and 19, objected to claims 6 and 15 and rejected the remaining claims. By this Amendment, new claim 20 has been added. Thus, claims 1-8 and 10-20 are pending in the application. The Examiner's rejections are traversed below.

Rejection Based on U.S. Patent 6,008,454 to Kawakita

In item 2 on page 2 of the Office Action the Examiner has maintained the rejection of claims 1, 7 and 8 under 35 U.S.C. §102 as anticipated by Kawakita.

Referring to Figures 1 and 2, Kawakita is directed to a storage box for electronic control units. The storage box employs an inner box 11 surrounded by an outer box 12. The inner box 11 has a storage section 11b which houses an electronic control unit 20. A filter opening 11g in the inner box 11 is sealed with a filter 16 which allows air to pass but not water (see claim 2). Apart from the filter opening 11g, the inner box 11 is sealed with respect to the outside. A grommet hole 11h provides electrical connection for the electronic control circuit 20 but is also sealed to the outside. Inner box 11 is built within the outer box 12. The outer box 12 provides an intake opening 12b (Figure 1) for connection to an air conditioning device or open to the outside air. Air introduced through intake opening 12b flows through spaces 15 and 14 between the outer box 12 and the inner box 11, and exits through an exhaust opening 11d of the outer box 12. Because there is an outer box surrounding the inner box, there is no problem with dust particles intruding into the inner box. This is prevented by the outer box and not by the filter 16.

In item 2 on page 2 of the Office Action, the examiner takes the position that the claims are not limited to a single housing so that the Examiner reads the inlet and outlet set forth in the claims on intake opening 12b in the outer box 12 and exhaust opening 11d from the inner box 11. In addition, the Examiner takes the position that Kawakita provides an airflow to the unit or housing 10 to build up an airflow through the unit 10.

In contrast to Kawakita, in the present invention the claimed "at least one water repellent membrane filter" is "arranged in an air inlet of the housing". In contrast, the Examiner reads the claimed inlet on the intake opening 12b in the outer box 12 of Kawakita. Clearly this air inlet does not include a filter arranged therein. Therefore, it is submitted that claim 1 patentably distinguishes over the prior art.

It is also submitted that Kawakita does not teach or suggest the claimed “at least one cooling device to build up an airflow in the housing and to lead the filtered cooling air, which is heated up because of flowing through the electrical subassemblies, out of the housing through at least one air outlet” as set forth in claim 1.

Heat produced by the electronic control unit 20 in the inner box 11 of Kawakita results in a higher pressure in the inner box compared to the air in the outer box. As a result, hot air escaping from the inner box will prevent cooling air from entering the inner box. To provide an active cooling of the electronic device within the inner box by an airflow, an active cooling system that builds up an airflow is needed. Otherwise, the cooling in the inner box can only be regarded as passive cooling, mainly serving to reduce the over pressure in the inner box due to the higher temperature. Kawakita does not provide such an active cooling device for building up an airflow within the inner box. In contrast, the present claimed invention provides active cooling with a cooling device for building up an airflow in the housing, so that cool air from the environment of the housing flows through the membrane filter into the housing. Thus cool air is heated up by contacting the electrical subassemblies in the housing, and flows out of the housing through an air outlet.

In summary, referring to claim 1, Kawakita does not teach or suggest:

“...at least one water-repellent membrane filter arranged in an air inlet of the housing for surface filtration of dirt particles from cooling air flowing into the housing for cooling the electrical subassemblies; and

at least one cooling device to build up an airflow in the housing and to lead the filtered cooling air, which is heated up because of flowing through the electrical subassemblies, out of the housing through at least one air outlet.”

Therefore, it is submitted that claim 1 patentably distinguishes over Kawakita.

Claims 7 and 8 depend from claim 1 and include all of the features of that claim plus additional features which are not taught or suggested by the prior art. Therefore, it is submitted that claims 7 and 8 also patentably distinguish over the prior art.

Prior Art Rejection Based on Ghorbani et al. and Kobayashi

In item 2 on pages 2 and 3 of the office Action, the Examiner has maintained the rejection of claims 1-5, 7-8, 10-14 and 16-17 under 35 U.S.C. §103 as unpatentable over Ghorbani et al. in view of Kobayashi.

Ghorbani et al. is directed to an outside telecommunications equipment enclosure having a hydrophobic vent. Figure 3 which is an exploded view of a hydrophobic vent, is described from column 2, line 50 to column 4, line 47. As described therein, the filtering of dust particles and liquids is done in two stages. In the first stage, dust particles are filtered by a screen 34 which is positioned on an exterior side of the enclosure. The screen is a wire mesh made of plastic, aluminum or stainless steel. In the second stage, a filter sheet 38 including hydrophobic material 40 prevents liquids from passing through. The filter sheet 38 maintains the position of the circular hydrophobic material 40 in the correct position with respect to circular openings 30 in the enclosure. It is clear that the dust particle screen 34 is outside of the enclosure. Further, the filter sheet 38 has no filtering functionality other than by virtue of the hydrophobic material 40 which only filters liquids. See column 3, lines 31-32 which state that this material is used "to prohibit liquids from passing therethrough."

The Kobayashi patent is directed to a filter for air cleaning which includes a layer of water repellent fiber and a layer in which fiber bundles comprise aggregates of water-absorbent fibers. The filter is used for cleaning outside air to be taken into factories, buildings, etc. particularly to remove salt particles contained in the outside air in coastal areas. The filter disclosed in Kobayashi consists of a first water-repellent layer (A) (column 3, lines 21-23) which is described to be made of, for example, a porous membrane of Teflon (column 3, lines 32-33), and a water-absorbent layer (B) (column 3, lines 58-61) located upstream (of layer A) (column 4, lines 48-51). Kobayashi describes that the two layers provide different particle collection efficiencies, wherein the efficiency of layer (B) is lower than that of layer (A) (column 3, line 46 to column 4, line 3).

The arrangement of Kobayashi is an aggregation of two separate filters with different characteristics, to provide a filtering process in two stages. Salt particles small enough to pass through layer (B) with its lower particle collection efficiency, might be stopped by layer (A), but would consequently get stuck in the fiber bundles or voids of layer (B), causing the clogging of layer (A) after a certain time. The same affects would occur if yet another layer for removing dust particles is arranged upstream of layer (B) or in between layers (B) and (A) (column 4, lines 57-60).

In contrast to Kobayashi, in the present claimed invention, the water-repellent membrane filter does not consist of multiple layers with different filter characteristics for different forms of filtering (i.e., water, salt, dust...) but instead provides a surface filtration of water and dust at the same filter layer. The characteristics of the dust filtering of Kobayashi are not disclosed in detail, but it appears that it is a well known mesh filter rather than a surface filter. In particular, column 4, lines 62-65 of Kobayashi state "airborne dust adheres to a filter".

Even if it could be urged that the filter disclosed in Kobayashi, with its multiple filter layers for different purposes, might replace the two stage filtering (34 and 38) or Ghorbani et al., this combination still does not teach the claimed surface filtering of water and dust. The only difference between Kobayashi and Ghorbani et al. is that Kobayashi discloses an aggregation of the two filtering stages (34 and 38) over Ghorbani into one single filter with a number of layers. It is also noted that Kobayashi states that the water repellent layer (A) could be realized by a porous membrane of Teflon (i.e., PTFE) (see, column 3, lines 46-53). It is noted that PTFE has a limited particle collection efficiency. Therefore, the stopping of dirt depends on the characteristics (size of pores, required air permeability) of the material used for the layer.

As discussed above, there is no disclosure that Kobayashi provides a filter which is capable of surface filtration of dirt particles as is done by the present claimed invention. Therefore, it submitted that one of ordinary skill in the art would not have been lead to replace the dust particle screen 34 of Ghorbani and the filter sheet 38 including hydrophobic material 40 in Ghorbani with the Kobayashi filter, since there is no teaching that Kobayashi filters both dirt particles and water from the air. Therefore, it is submitted that claims 1-5, 7-8, 10-14 and 16-17 patentably distinguish over the prior art.

Information Disclosure Statements

A Supplemental Information Disclosure Statement was filed June 5, 2003. It is respectfully requested that this Supplemental Information Disclosure Statement be considered and entered. For convenience, a copy of the 1449 Form submitted with that IDS is attached to this Amendment. Applicants are submitting herewith an additional IDS to submit additional documents for the Examiner's consideration, including several English translations of foreign Office Action relating to prior art documents, some of which have already been made of record in this case.

Serial No. 09/581,712

New Claim 20

New claim 20 recites features relating to a cooling arrangement for an apparatus having a single housing and recites:

“at least one water-repellant membrane filter arranged in an air inlet of the single housing for surface filtration of dirt particles from cooling air flowing into the single housing for cooling the electrical subassemblies; and

at least one cooling device to build up an air flow in the single housing and to lead the filtered cooling air, which is heated up because of flowing through the electrical subassemblies, out of the single housing through at least one air outlet.”

Therefore, it is submitted that claim 20 patentably distinguishes over the prior art.

Request for Interview

After the Examiner has received and reviewed this Amendment, it is respectfully requested that the Examiner contact the undersigned in order to hold an interview to discuss the current status of the case prior to issuing a new Office Action in this case.

Summary

It is submitted that none of the references, either taken alone or in combination, teach the present claimed invention. Thus, claims 1-8, and 10-20 are deemed to be in a condition suitable for allowance. Reconsideration of the claims and an early notice of allowance are earnestly solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

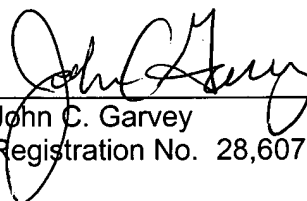
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If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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Date: 12-1-03

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